

Prevalence and Clinical Profile of Bovine Theileriosis in Clinically Suspected Dairy Cattle of Coastal Odisha, India

Shraddha Sinha¹, Niranjana Sahoo¹, Sangram Biswal¹, Manaswini Dehuri^{2*}, Vivek Kumar³

¹Department of Veterinary Epidemiology and Preventive Medicine, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India

²Department of Veterinary Parasitology, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India

³Division of Pathology, ICAR- Indian Veterinary Research Institute, Izatnagar, Bareilly, U.P-243122

*Corresponding Author E-mail: sinhashraddha220@gmail.com

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ABSTRACT

Bovine theileriosis is one of the most economically important tick-borne haemoprotozoan diseases affecting dairy cattle in tropical and subtropical regions. The disease causes significant production losses owing to decreased milk yield, anaemia, reduced productivity and mortality in severe cases. The present investigation was undertaken to determine the prevalence and clinical profile of bovine theileriosis among clinically affected dairy cattle presented to the Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar. A total of 55 cattle showing clinical signs suggestive of haemoprotozoan infection were examined using Giemsa-stained peripheral blood smears. Microscopic examination revealed Theileria spp. infection in 38 animals (69.09%), whereas 17 animals (30.91%) were negative. The commonly observed clinical manifestations included pyrexia, pale mucous membranes, enlargement of prescapular lymph nodes, anorexia, dyspnoea, salivation, weakness and decreased milk yield. The findings indicate that bovine theileriosis remains an important disease among dairy cattle in coastal Odisha. Microscopic examination of Giemsa-stained blood smears proved to be a rapid, economical and reliable diagnostic tool for field diagnosis of clinical theileriosis. Regular epidemiological surveillance, integrated tick control and early diagnosis are essential to minimize economic losses associated with the disease.

Keywords: Bovine theileriosis, dairy cattle, Giemsa stain, prevalence, Odisha, haemoprotozoan disease.

INTRODUCTION

Bovine theileriosis is a major tick-borne haemoprotozoan disease of cattle caused by protozoan parasites belonging to the genus

Theileria. The disease is widely distributed in tropical and subtropical countries where climatic conditions favour the survival and multiplication of ixodid tick vectors.

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In India, *Theileria annulata* is considered the principal etiological agent of tropical theileriosis, although members of the *Theileria orientalis* complex have also emerged as important pathogens in dairy cattle (Uilenberg, 1995; Taylor et al., 2016).

The disease has considerable economic significance because it reduces milk production, body weight, reproductive performance and working efficiency while increasing treatment costs and mortality. Crossbred and exotic dairy cattle are particularly susceptible due to their comparatively lower resistance to tick infestation and haemoprotozoan infections (Ghosh and Nagar, 2014; Constable et al., 2017).

The occurrence of bovine theileriosis is influenced by climatic conditions, tick abundance, management practices and host susceptibility. Warm temperatures, high humidity and prolonged rainfall favour the multiplication of tick vectors, thereby increasing disease transmission in endemic regions (Dantas-Torres, 2015). Odisha provides favourable agro-climatic conditions for tick survival, making bovine theileriosis an important disease affecting dairy production. Affected cattle commonly exhibit persistent fever, enlargement of superficial lymph nodes, anorexia, pale mucous membranes, weakness, respiratory distress and reduced milk production (Radostits et al., 2007; Sivajothi et al., 2015). Prompt diagnosis is therefore essential for effective clinical management and reducing production losses.

Although molecular diagnostic techniques are highly sensitive, microscopic examination of Giemsa-stained peripheral blood smears remains the most widely employed diagnostic method in routine veterinary practice because it is rapid, economical and practical under field conditions (Taylor et al., 2016). Information regarding the occurrence of bovine theileriosis among clinically affected dairy cattle in coastal Odisha remains limited. Therefore, the present study was undertaken to determine the prevalence and describe the clinical profile of

bovine theileriosis in clinically affected dairy cattle presented to a veterinary teaching hospital using microscopic examination of Giemsa-stained blood smears.

MATERIALS AND METHODS

Study Area

The present investigation was carried out in the Department of Veterinary Epidemiology and Preventive Medicine, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha, India, during June 2020 to July 2021. Blood samples were collected from cattle presented to the Teaching Veterinary Clinical Complex (TVCC). The animals originated from the coastal districts of Cuttack, Khurda and Puri (Figure 1).

Study Animals

A total of 55 dairy cattle showing clinical signs suggestive of haemoprotozoan infection were included in the study. Animals exhibiting pyrexia ($>104^{\circ}\text{F}$), enlarged superficial lymph nodes, pale mucous membranes, anorexia, dyspnoea, weakness, salivation and decreased milk production were selected for laboratory investigation.

Blood Sample Collection

Approximately 2–3 mL of whole blood was collected aseptically from the jugular vein of each animal into sterile EDTA-coated vacutainer tubes. Samples were transported to the laboratory under chilled conditions and processed immediately.

Microscopic Examination

Thin peripheral blood smears were prepared on clean grease-free glass slides, air-dried and fixed in absolute methanol for five minutes. Smears were stained with 10% Giemsa stain for approximately 40 minutes, washed gently with buffered water, air-dried and examined under oil immersion ($100\times$). Multiple microscopic fields were examined before declaring a sample negative. Samples showing

characteristic intraerythrocytic piroplasms of *Theileria* spp. were considered positive.

Statistical Analysis

Disease prevalence was calculated using the formula:

$$\text{Prevalence (\%)} = (\text{Number of positive animals} / \text{Total animals examined}) \times 100$$

Descriptive statistics were used to summarize the prevalence and clinical observations. Results

Clinical Findings

During the study period, a total of 55 dairy cattle presented to the Teaching Veterinary Clinical Complex with clinical signs suggestive of haemoprotozoan infection were

investigated. The commonly observed clinical manifestations included high fever ($>104^{\circ}\text{F}$), pale mucous membranes indicative of anaemia, enlargement of prescapular lymph nodes, anorexia, weakness, dyspnoea, salivation and reduced milk production. Most affected animals exhibited more than one clinical sign, indicating systemic involvement.

Microscopic Detection of *Theileria* spp.

Microscopic examination of Giemsa-stained peripheral blood smears demonstrated characteristic intraerythrocytic piroplasms of *Theileria* spp. in 38 animals, whereas 17 animals were negative. The overall prevalence among clinically affected cattle was 69.09% (Figure 2).

Table 1. Microscopic prevalence of bovine theileriosis

Particulars	Number	Percentage (%)
Total cattle examined	55	100.00
Positive for <i>Theileria</i> spp.	38	69.09
Negative	17	30.91

The relatively high prevalence observed indicates that bovine theileriosis remains an important haemoprotozoan disease among dairy cattle presented to veterinary hospitals in coastal Odisha.

Microscopic Characteristics

Positive blood smears revealed characteristic intraerythrocytic piroplasms within erythrocytes. (Figure 3) The parasites appeared

as small round, oval and rod-shaped bodies occurring singly within red blood cells. These findings were considered confirmatory for microscopic diagnosis of bovine theileriosis.

Clinical Profile of Positive Animals

Microscopy-positive animals consistently exhibited one or more characteristic clinical abnormalities associated with bovine theileriosis.

Table 2. Clinical findings observed in microscopy-positive cattle

Clinical finding	Observation
Pyrexia ($>104^{\circ}\text{F}$)	Present
Pale mucous membranes (Anaemia)	Present
Enlarged prescapular lymph nodes	Present
Anorexia	Present
Weakness	Present
Dyspnoea	Present
Salivation	Present
Reduced milk yield	Present

These observations suggest that bovine theileriosis produces marked systemic illness,

resulting in deterioration of the general health status and productivity of affected dairy cattle.

DISCUSSION

The present investigation recorded a microscopy-based prevalence of 69.09% among clinically affected dairy cattle. The relatively high prevalence observed may be attributed to the fact that only symptomatic animals presented to the veterinary teaching hospital were included in the study. Hospital-based investigations generally report higher prevalence than field surveys because clinically affected animals are more likely to harbour detectable parasitaemia.

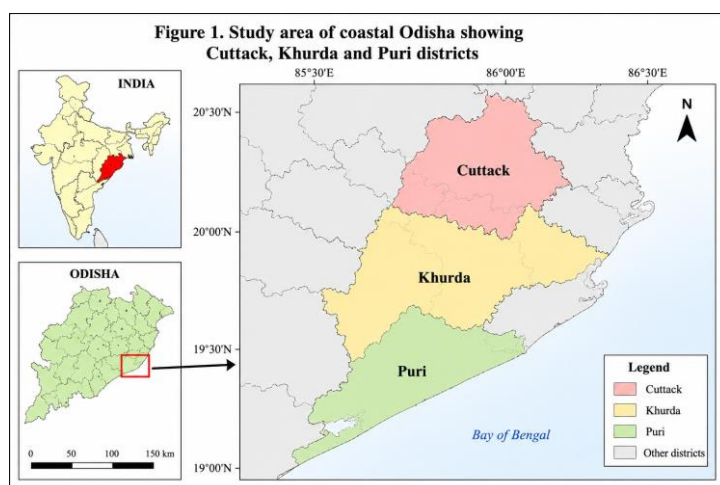
The occurrence of bovine theileriosis is closely associated with environmental conditions favouring tick multiplication. Odisha experiences a warm and humid climate for most of the year, providing suitable ecological conditions for ixodid ticks responsible for disease transmission (Ghosh and Nagar, 2014). Similar observations have been reported from different regions of India where climatic conditions significantly influence the epidemiology of tick-borne diseases.

The clinical manifestations observed during the present investigation, including pyrexia, anaemia, enlargement of prescapular lymph nodes, anorexia, dyspnoea, salivation and reduced milk production, were consistent with the classical presentation of bovine tropical theileriosis reported by Radostits et al. (2007), Constable et al. (2017) and Sivajothi et al. (2015). Anaemia observed in affected animals is primarily attributed to erythrocyte destruction, while lymph node enlargement reflects proliferation of infected lymphocytes during the early stages of infection.

Microscopic examination of Giemsa-stained peripheral blood smears proved to be an effective diagnostic tool for detecting clinical cases of bovine theileriosis. Although molecular diagnostic techniques possess greater analytical sensitivity, especially in carrier animals with low parasitaemia, microscopy continues to remain the most economical and practical diagnostic technique in routine veterinary practice, particularly in developing countries where advanced molecular diagnostic facilities may not always be available (Taylor et al., 2016).

The high occurrence of bovine theileriosis observed in the present study highlights the necessity for strengthening integrated tick management programmes. Strategic acaricide application, regular examination of dairy herds, improvement of housing hygiene and early veterinary intervention remain essential for reducing disease incidence and minimizing production losses. Farmer awareness regarding tick control and prompt recognition of clinical signs should also be encouraged to improve disease management in endemic regions.

Overall, the findings of the present investigation confirm that bovine theileriosis continues to be an important constraint to dairy production in coastal Odisha. Routine microscopic examination of Giemsa-stained blood smears remains a valuable diagnostic technique for early detection of clinical infections and should continue to be promoted in veterinary diagnostic laboratories.



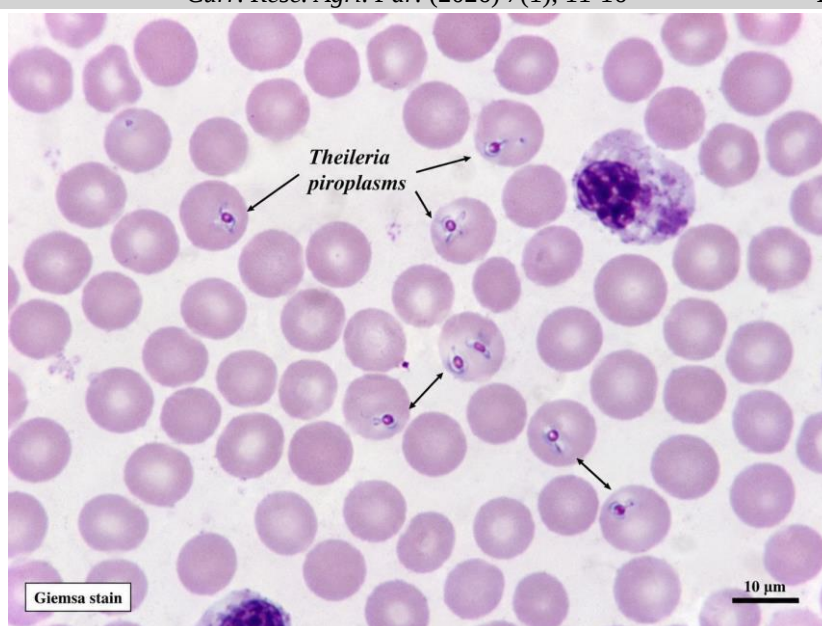
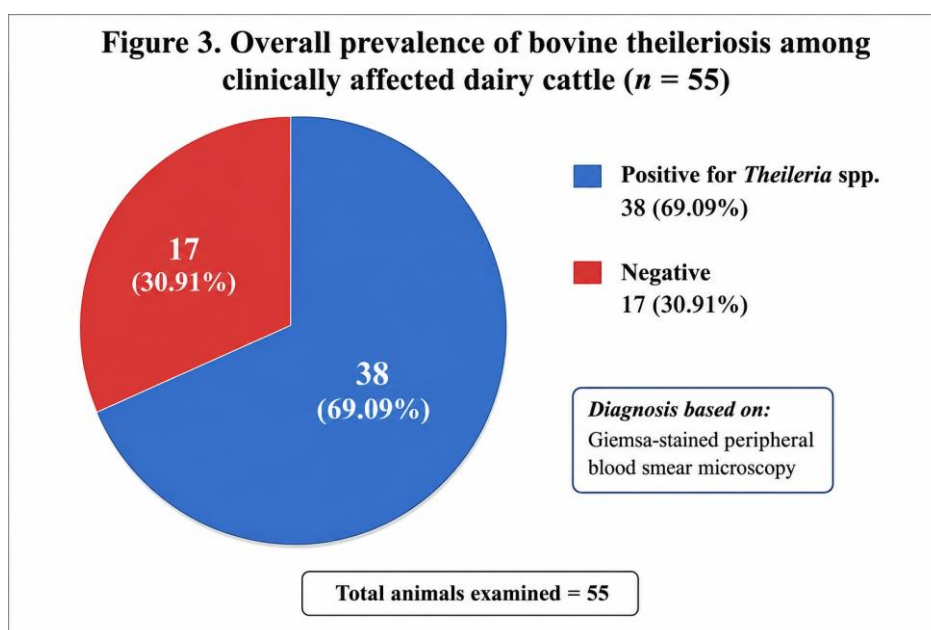


Figure 2: Giemsa-stained peripheral blood smear showing intraerythrocytic piroplasms of *Theileria* spp



CONCLUSION

The present study demonstrated that bovine theileriosis is highly prevalent among clinically affected dairy cattle presented to the Teaching Veterinary Clinical Complex, Odisha University of Agriculture and Technology, Bhubaneswar. An overall prevalence of 69.09% was recorded based on microscopic examination of Giemsa-stained blood smears.

The disease was characterized by fever, anaemia, enlargement of prescapular

lymph nodes, anorexia, dyspnoea, salivation, weakness and reduced milk production. Microscopic examination proved to be a rapid, economical and dependable diagnostic method for routine diagnosis of clinical bovine theileriosis.

Implementation of integrated tick control programmes, improvement in herd management and early laboratory diagnosis are essential for reducing the economic burden associated with bovine theileriosis in endemic regions

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

Ethical Approval

The present investigation was carried out on naturally occurring clinical cases presented to the Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar. Blood samples were collected as part of routine diagnostic investigations following standard animal handling procedures. No experimental

infection or invasive procedures beyond routine clinical diagnosis were performed.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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